



The National Park Service wishes to thank Toyota USA Foundation for donating one million dollars to make National Park Labs possible at Golden Gate National Recreation Area and four other parks across the country.

We also wish to acknowledge the important role played by the National Park Foundation in working with Toyota USA Foundation to establish and guide this generous grant.

National Park Labs is a program of the National Park Service, National Park Foundation, and Toyota USA Foundation. This multi-year program is the first of its kind to provide high school students with experiences that will enhance the quality of science and mathematics and foster stewardship of national park resources. Five national park sites were competitively selected to participate in this exciting endeavor. The other NPL sites are Carlsbad Caverns National Park (NM) and Guadalupe Mountains National Park (TX), Lowell National Historical Park (MA), National Capital Region Parks (DC), and Santa Monica Mountains National Recreation Area (CA).



Overview

National Park Labs at Milagra Ridge (NPL) is a hands-on education program that engages high school students in a project-based science curriculum. This Educator's Handbook has been prepared for the classroom teachers and the Site Stewardship Program (Golden Gate National Parks Association-GGNPA) and National Park Service (NPS) staff who together make up the National Park Labs education team. It contains the background information, lesson plans, and handouts for the modules that comprise the program.

National Park Labs is linked to the Environmental Studies Course and Science I Core Course at Oceana High School, as well as science courses at other Jefferson Union School District high schools. The program includes a classroom-based introductory module, five field-based modules, and a culminating activity. The five field-based modules are scheduled to coincide with the seasonal work of the park's restoration team.

Perspectives provides the students with an opportunity to get acquainted with the National Park Labs web site, the restoration cycle, and the process of formulating study questions. A word puzzle helps students become familiar with vocabulary that will be used throughout the program. A classroom lesson facilitated by NPS staff gives students a brief history of Milagra Ridge, engages them in a discussion about the mission of the National Park Service, and creates a context for learning about Environmental Justice. After the Park Service visit, students create a list of Top Ten Environmental Rights and share a vision of what is and what should be in a national park.

Plant Propagation revolves around genetic diversity and plant reproduction. After playing a board game that introduces the concept of genetic diversity, students visit one of the park's native plant nurseries to help with propagation and other nursery functions. In a classroom experiment, students sprout seeds, introduce variable soil conditions, and then monitor the effects of these conditions on the seedlings. Students review the concepts with *The Private Life of Plants*, a video illustrating the complex interactions between plants, animals and the abiotic elements of the environment.

Invasive Plant Removal focuses on interdependence in nature. This module begins with several National Park Labs web site-based lessons that feature Web Quest, an interactive investigation of the Endangered Species Act. Students again access the web site to practice using a dichotomous key. During a field visit to the park, students remove invasive plants from a restoration site. The module concludes with a lesson in Environmental Justice and community planning.

Planting begins with a lesson that helps students understand plant structure and adaptation. During the Planting field visit, students study structure and function as they transplant indigenous plants into a restoration site. The field lesson concludes with a look at the importance of volunteers in achieving restoration goals. Back in the classroom, students research international restoration projects to understand the global nature of ecological restoration. They then use the National Park Labs on-line Plant Guide and other resources to create a multicultural quilt of plant uses.

Land Values introduces students to different perspectives on land use. A classroom lesson has students consider the history of and formulate questions about the Marin Headlands and Milagra Ridge Nike Missile Sites (Cold War Era). The field session takes students to the Marin Headlands to tour the Nike Missile Site and evaluate changes in the landscape. In a follow-up classroom lesson, they assess the differing values held by the military, National Park Service, and nearby communities.

Monitoring reemphasizes interdependence in nature. In preparation for the field session, students learn how to use a compass, digital camera, and record data. During the field visit, they perform quantitative and qualitative monitoring studies of Milagra Ridge. Students compare their qualitative monitoring to work done by previous classes. The module concludes with students drafting a proposal to the National Park Service with recommendations for applying monitoring to endangered species management.

A **Culminating Project** is chosen by the teacher and students to fit the needs of the class and allow students to apply what they learned during the program. Classes may choose to create exhibits describing some aspect of their restoration work and present these exhibits at a local restoration fair, or perform a restoration project in a local city park. Students may choose to research local issues, propose solutions, and take actions.

CURRICULUM ORGANIZATION

The modules in this curriculum are divided into pre-visit, on-site, and post-visit lessons. The first page of each module provides an overview of these lessons and summarizes the activities. The next pages contain background information on topics covered in the module. The lesson plans that follow include a summary, expected duration, materials list, facilitation procedures, and handouts when applicable.

Icon Key: Icons used in the lesson plans and summaries designate where the lessons take place and whether the teacher or NPS staff facilitate the lessons.

Location Icons:



Classroom



Park



Web-based

Facilitator Icons:



Teacher



NPS Staff

Glossary: At the end of the handbook we have included a Glossary of terms for all words that may be new to students or teachers.

AUTHENTIC ASSESSMENT

Students will keep a journal documenting their thoughts and questions during the program. These journals can be used to assess the students' understanding of important concepts and the evolution of their knowledge and attitudes. Each module includes integrated assessment activities. We encourage teachers to create a rubric based on these activities.

EDUCATIONAL STANDARDS

The National Park Labs curriculum focuses on science principles learned through authentic restoration activities in a national park. Students also practice applied math skills and examine issues in Environmental Justice that relate to the restoration work. The program is an excellent vehicle for helping students obtain important life skills necessary to find and keep employment, and effectively contribute to society.

The following sources were used to compile the educational standards for the program:

- ▶ **Science:** The science standards correlate directly to Jefferson Union School District's (JUSD) life science standards for grades 9 through 12. Specifically, the program teaches Science 1.3.4 – Analyze and explain examples of the interdependence of organisms in ecosystems, biochemical processes, the role of genetic inheritance, and the patterns and processes through which organisms and ecosystems change over time. The program also supports five other elements of the 1.3 science standards.
- ▶ **Math:** The math contained in the program supports JUHSD's Mathematics 1.2.1 and 1.2.2 – standards related to Algebra. Students all gain from using the applied math within the context of science.
- ▶ **Social Studies:** This program supports JUHSD's World History, Cultures and Geography and the United States History course studies of the Cold War Era. Students utilize historic landmarks within the GGNRA to analyze the local and national politics of the Cold War.
- ▶ **Environmental Justice:** The Environmental Justice aspects of the program meet national behavioral studies standards for grades 9 through 12. These standards are based on information from *Content Knowledge, A Compendium of Standards and Benchmarks for K-12 Education*. The Environmental Justice components are partially derived from *Principles of Environmental Justice* issued by the First National People of Color Environmental Leadership Summit, October 1991, Washington, D. C.
- ▶ **Life Skills:** The program incorporates standards for grades 9 through 12 from the National Life Skills section of *Content Knowledge, A Compendium of Standards and Benchmarks for K-12 Education*.

PROGRAM LOGISTICS

So that all students may participate in and enjoy their program days at Milagra Ridge, please take careful note of the following:

- **We must have one completed “Agreement for Sponsored Voluntary Services” form for each class** that participates in the program. We must also have a signed **“Parental Approval” form for each student**. We have provided master copies of these forms on the following pages of this handbook. Please note that park policy requires each individual/group in the program to complete these forms. **Those who do not complete the required forms will not be allowed to participate.** Groups complete and return these forms at the beginning of the school year, or before the first field session in which they will participate.
- Clothing appropriate to the nature of the activities and weather conditions at the Milagra Ridge is required. The following is a list of program-day considerations that need to be relayed to students so they are prepared and can have a positive learning experience.

Dress in layers to accommodate the variable temperatures characteristic of Milagra Ridge (clothing and footwear may get dirty).

On sunny days, a cap and sunscreen are needed.

If there is a chance of rain, bring personal rain gear if possible.

- Arrangements can be made to accommodate most students with special needs. Please call the NPS staff to discuss any specific circumstances.

Form No. 10-86
Rev. (9/99)

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
VOLUNTEERS-IN-PARKS PROGRAM

Golden Gate National Recreation Area

Agreement for Sponsored Voluntary Services

NAME OF SPONSOR, ORGANIZATION, OR EVENT

ADDRESS (Street, city, state, zip code)

CONTACT PERSON (Liaison for day-to-day operations)

WORK TELEPHONE (Including area code)

HOME TELEPHONE (Including area code)

Brief description of work to be performed, including minimum time commitment required.

Do work to support native habitat restoration in outdoor restoration areas and the native plant nursery, including (but not limited to) transplanting seedlings, removing invasive species, sowing seeds, collecting seeds, filling flats and pots with soil, disposing of plant material and soil, cleaning up at the nursery and work sites, and moving plants, pots, flats, equipment and tables. Use tools including (but not limited to) picks, shovels, trowels, and shears.

We agree to obtain parental or guardian consent for each individual under 18 years of age and to comply with applicable child labor laws. We understand that the individuals volunteering under this agreement will not receive any compensation for the above work and that they will NOT be considered to be Federal employees for any purpose other than tort claims and injury compensation, and we understand that volunteer service is not creditable for leave accrual or any other employee benefits. We also understand that either the National Park Service, or we, may cancel this agreement at any time by notifying the other party. We agree to provide the National Park Service with a listing of active participants, and the number of hours each contributed, when and as requested.

Signature

Date

The National Park Service agrees, while this arrangement is in effect, to provide such materials, equipment and facilities that are available and needed to perform the work described above, and to consider you as a Federal employee only for the purpose of tort claims and compensation for work related injuries.

Signature of Park VIP Coordinator

Date

TERMINATION OF AGREEMENT

Agreement Terminated on

Month, Day, Year

Signature of Park VIP Coordinator

Form No. 10-89
(1/83)

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
VOLUNTEERS-IN-PARKS PROGRAM

Golden Gate National Recreation Area

Parent Approval Form

NAME OF VOLUNTEER

PARENT OR GAURDIAN'S NAME

ADDRESS

PHONE: (Residence)

(Business)

I affirm that I am the parent/guardian of the above named volunteer. I understand that the National Park Service's Volunteers-In-Parks program does not provide compensation, except as otherwise provided by law, and that the service will not confer on the volunteer the status of a Federal employee. I have read the attached description of the work that the volunteer will perform.

I give my permission for _____ to participate in this program

sponsored by _____

(Name of sponsoring organization, if applicable)

at _____ from _____ to _____

(Name of park or office)

(Date)

(Date)

(Signature)

(Date)